

BIOMEDICAL ENGINEERING IN CARDIOVASCULAR DISEASE: HEART ATTACK IN VITRO

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Abstract: Heart disease (which includes Heart Disease, Stroke and other Cardiovascular Diseases) is the No. 1 cause of death in the United States, killing nearly 787,000 people alone in 2011. Cardiovascular diseases also claims more lives than all forms of cancer combined. The purpose of this study is to effectively passage cardiomyocytes and to successfully build a perfused bio-reactor style cell culture, with controlled flow of the media and oxygen content, for the use of inducing ischemia of cardiomyocytes. We hypothesize that a perfused cardiac cell culture will allow us to get a clearer understanding of what happens when heart cells become ischemic, and enable us to test interventions and treatment options in a dynamic environment closely simulating in vivo conditions. To test this hypothesis, we plan to effectively harvest and culture cardiomyocytes by first perfecting the cell culturing technique using L6 Myoblasts cells because they can easily regenerate and are easier to passage. After successfully harvesting cardiomyocytes, we will use the cell culture technique to passage and culture more cardiomyocytes. The creation of the perfused cardiac cell culture will mimic the blood flowing system to and from the heart cells, and allow us to control the oxygen and nutrient content experienced by the cells. The device will allow us to investigate how the cardiomyocytes are being effected during the full duration of ischemia.

Keywords: Cardiovascular disease, cardiomyocytes, ischemia, in vitro

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